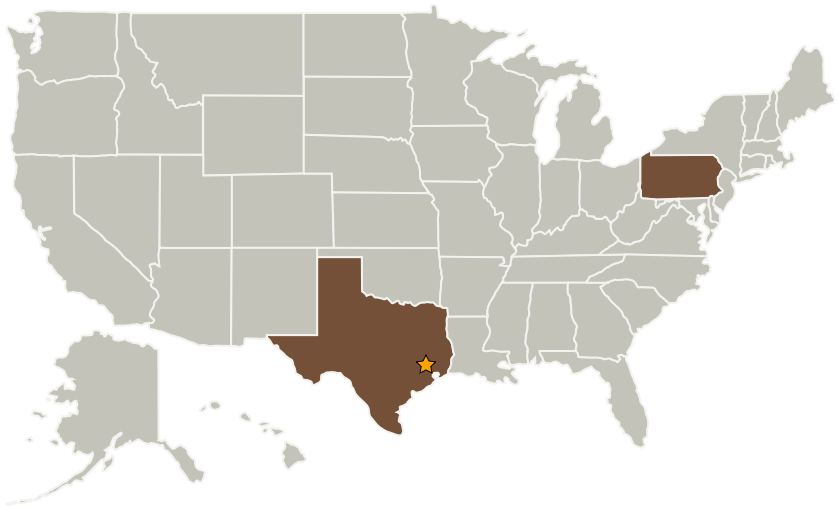
High Performance Low Mass Nanowire Enabled Heatpipe, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

Heat pipes are widely used for passive, two-phase electronics cooling. As advanced high power, high performance electronics in space based and terrestrial applications produce ever increasing heat fluxes, heat pipes with improved thermal capacity are sought. Illuminex Corporation has demonstrated that using copper nanowire arrays as the wick in heat pipes increases the heat transfer capabilities. Phase I developed processing techniques to engineer copper nanowire arrays on copper sheet that were subsequently incorporated into vapor chamber style heat pipes as the wicking material at the evaporator region. In Phase II, the program will be advanced to manufacture large area copper sheets fully covered with nanowires on one side. This material will be used to construct the entire heat pipe, package and wick. This will enable the development of high performance, lightweight, low-profile (< 1 mm) heat pipes with enhanced thermal transfer properties. The decrease in weight and size is desirable for NASA space projects and will find commercial application in radar systems, servers, and portable electronic devices. The use of less material in heat pipe manufacture will result in lower production costs while the superior performance and smaller size will provide electronic system designers with greater flexibility in thermal management system design.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Illuminex Corporation	Supporting Organization	Industry	Lancaster, Pennsylvania

Primary U.S. Work Locations	
Pennsylvania	Texas

Project Transitions

February 2009: Project Start

February 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.2 Heat Transport